REMARKS

Following is Applicants' response to the Final Office Action mailed 03 December 2003 and the Advisory Action mailed 02/24/2004 and which is accompanied by a Request for Continued Examination. A response is due 03 April 2004 with a One-Month Petition for Extension of Time, making this a timely response. Applicant requests withdrawal of the Final Amendment and Allowance of the claims.

As the Amendment After Final Rejection was not entered, Claims 1-16 were pending in the application prior to entry of the current amendment and Claims 1-25 are pending after entry of this current amendment.

Applicant has reviewed the cited art and the Examiner's statements relative to that art and to the requirement that structural features intended by recitation of a field of use be specifically recited as structural differences in the claims.

Applicant first presents a description of the technology so that the distinctions presented in the claims may be more readily understood and appreciated.

A resistive sensor of the type presented is constructed with a resistor material and a conductor trace. These two components are sometimes referred to as the track and the collector. A wiper typically bridges the resistor and conductor trace and creates a variable voltage when the third connection is made. The voltage is proportional to the wiper position on the resistive track. In a typical position sensor the observed voltage will be near 5 volts at one end of travel, and near 0 volts at the other end of travel. Resistors will typically have a total resistance of 1 to 10K ohms when measured from end to end. The conductor trace, used to connect the resistor to the wiper, typically will have a resistance value of less than 1 ohm total when measured from end to end.

The conductor trace may be constructed of various thick film silver materials containing 40 to 80% silver or some other conductive metal in a resin matrix. The resistance value of the conductor may typically be about 0.2 ohms per square. The conductor trace may also fabricated from a copper trace as normally found on printed circuit boards.

The resistor trace may consists of carbon particles embedded in a resin matrix. The resistance value is controlled by the carbon content, which may vary from 10 to 20% by weight or some other value. Resistor materials typically do not contain metallic

materials such as silver because the conductive phases will connect and result in an inadequate resistance value. Resistance materials used for sensors of this type range from 50 to 5000 ohms per square.

Carbon resistive traces have a relatively high surface resistivity due to the carbon structure. Carbon is generally classified as a semiconductor. The high surface resistance does not allow the sliding contact with a wiper to make a good electrical connection to the resistor, so that the accuracy of the position sensor is imperfect. In addition, the contact resistance varies depending on the local topography of the resistor material, and the output is further degraded and erratic.

One feature and improvement described in the instant patent application provides conductive silver islands embedded in the surface of the resistive matrix to reduce the contact resistance considerably. As described relative to the method of making, these embedded conductor phases are formed *in situ* during the curing operation and do not add appreciable material or processing costs to the resistive element manufacturing operation. The silver spheres described relative to certain claimed embodiments of the invention were chosen because they remain independent in the resistor structure and do not short together, which would result in a major decrease in resistance, rendering the resistor ineffective in a position sensor application.

The cited art does not disclose, teach, suggest, or provide any motivation to modify the prior-art structures to realize the claimed structure. Chacko at most describes a conductor material, such as used in conjunction with the resistor material on sensor products. Fairly high concentrations of conductive phases are used, such as the 40 to 85% conductive phases described in its Claim 1 that provide for very low resistance values, or the resistance values in its table 1 that are in milliohm range.

Bosze at most describes a method of forming a regular array of conductive islands on top of a surface for reduction of contact resistance. The islands are formed as an additional printing operation on top of a surface after the base resistor film is cured. They are not embedded in or formed in situ as in the presently claimed invention. Furthermore, the resistor material described is cermet instead of conductive plastic or a resistive carbon-plastic matrix as claimed. Cermet systems are fired at a

very high temperature to melt the glass matrix phase so that both the structure, the method of making, and the entire concept is considerably different that that for the instant patent application.

It is also noted that in practice, this Bosze structure and method proved impractical for production parts and was not commercially successful as are devices formed with the present invention's technology. Printing very small dots of gold or other conductors was found to be impractical due to the small size of the conductive islands. Screen clogging and poor print definition also contributed to the abandonment of the Bosze-based technology.

For at least these reasons the instant invention is different from the cited prior-art and although involving some silver and resin all relate to different applications and the structures and materials described in the cited prior art would not function as the resistor element or trace in a potentiometer or variable resistor,

Applicant has amended the claims to recite these structural features and differences as compared to the cited prior art. While applicant does not accept the propriety of the rejections, applicant has cancelled certain of the claims and amended others to moot or overcome the 35 U.S.C. 102 and 35 U.S.C. 103 rejections.

Claims 1, 2, 4, and 6 are rejected under 35 U.S.C. 102(e) are rejected as being anticipated by Chacko.

As the Examiner is aware, for a reference to anticipate a claim, the reference must teach every element of the claim (see M.P.E.P §2131). Applicant respectfully submits that Chacko fails to disclose or suggest every element of any of Claims 1, 2, 4 or 6.

With reference to Claim 1 as now amended, Applicant respectfully submits that Chacko and Chan et al alone or in combination are silent as to the features of:

> *... a carbon and plastic resistive matrix disposed as a layer on said substrate and having a layer thickness, said carbon being a current carrying phase of the matrix wherein a higher percentage of carbon relative to the percentage of plastic in the carbon and plastic resistive matrix producing a lower resistance and a lower percentage of carbon relative to the percentage of plastic in the carbon and plastic resistive matrix producing a higher resistance; and*

particles of conductive material no larger than about 6 microns formed in situ and embedded in a surface of said layer of resistive matrix and exposed and projecting therefrom for sliding contact with the wiper contact of the variable resistor, said particles of conductive material forming a conductive phase at the surface operative to reduce a contact resistance between said resistive element and said wiper but not being present in sufficient amount within a volume of said layer to significantly alter resistive properties of said resistive matrix, said particles of conductive material being present in an amount equal to 2 to 50 percent by weight of the resistive element and projecting therefrom for sliding contact with the wiper contact of the variable resistor but having a minor effect on the wear properties of the resistive element.

Accordingly, Applicant submits that the 35 U.S.C. §102(b) rejection of claim 1 and to claims dependent therefrom is improper and should be withdrawn. The elements of the amended claim are supported in the specification as filed.

Claim 2 as now amended adds the further limitation that: "the conductive material is deagglomerated smooth generally round metallic silver powder that promotes good electrical contact with said wiper and does not tend to join together to form conductive metallic silver paths at said surface or through portions of the carbon-plastic resistive matrix and thereby does not tend to lower the resistance of the carbon-plastic resistive matrix". Claim 4 as now amended adds the limitation that "the conductive material is selected from the group consisting of silver, palladium, gold, platinum, copper, highly conductive carbon, and combinations thereof; and said conductive material is in the form of a deagglomerated spherical metallic powder that promotes good electrical contact with said wiper and does not tend to join together to form conductive metallic paths at said surface or through portions of the carbon-plastic resistive matrix and thereby does not tend to lower the resistance of the carbon-plastic resistive matrix."

Applicant submits that Chacko fails to disclose these features. Claim 5 is patentably distinct from Chacko at least on the basis of the distinctions already recited relative to Claim 1. The features of Claim 6 have been incorporated into independent Claim 1 and cancelled. Accordingly, Applicant submits that the 35 U.S.C. §102(b) rejection of claims 2 and 4-6 is improper and should be withdrawn.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chacko in view of Bosze et al.

Applicants note that to establish a *prima facie* case of obviousness there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference teachings. Further, the cited reference (or references when combined) must teach or suggest all the claim limitations. (See M.P.E.P. §2142).

First, nether Chacko nor Bosze et al. alone or in combination teach all of the elements of the claims. Claim 1 has already been discussed relative to Chacko. Bosze fails to disclose or suggest a resistance element where: *"the conductive material is silver and palladium deagglomerated spherical metallic powder containing about 70 percent silver and 30 percent palladium that promotes good electrical contact with said wiper and does not tend to join together to form conductive metallic paths at said surface or through portions of the carbon-plastic resistive matrix and thereby does not tend to lower the resistance of the carbon-plastic resistive matrix."*

It is noted that Bosze et al. teaches an array of discrete spaced apart islands that is applied to the resistive layer in a repetitive pattern having a predetermined inter-island spacing (See Abstract). Bosze fails to teach or suggest that the conductive phase in embedded at the surface. Bosze also shows a structure that would not only wear over time and therefore fail to provide the property of having *"a minor effect on the wear properties of the resistive element" as claimed.*

Accordingly, Applicant submits that the 35 U.S.C. §103(a) rejection of claim 3 and to claims dependent therefrom is improper and should be withdrawn.

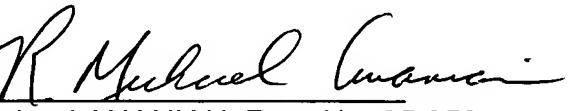
Applicant submits that Claims 7-16 are patentably distinct from the cited prior art for at least the reasons analogous (though not identical) to those recited relative to claims 1-6 and not repeated here.

New claims 17-25 have been added to round out the protection to which the applicant is entitled and to present additional embodiments of the invention. In some instances, the elements recited correspond to the elements already recited and examined relative to previously pending claims.

CONCLUSION

Applicants submit the claims are in condition for allowance, and notification of such is respectfully requested. If after review, the Examiner feels there are further unresolved issues, the Examiner is invited to call the undersigned at (650) 494-8700.

Respectfully submitted,
DORSEY & WHITNEY LLP

By 
R. Michael ANANIAN, Reg. No. 35,050
Attorneys for Applicant
Filed under 37 C.F.R. §1.34(a)

Four Embarcadero Center - Suite 3400
San Francisco, California 94111-4187
Tel.: (415) 781-1989 or (650) 494-8700
Fax: (415) 398-3249 or (650) 494-8771
PA-1071558